Two new species of *Astragalus* L. sect. *Incani* DC. (Fabaceae) from the Zanjan province (Iran)

Farrokh GHAHREMANINEJAD
Ali BAGHERI
Department of Plant Biology, Faculty of Biological Sciences,
Kharazmi University (Tarbiat Moallem University),
43 Mofatteh Avenue, 15719-14911 Tehran (Iran)
ghahremaninejad@tmu.ac.ir
bagheri@tmu.ac.ir

Ali Asghar MAASSOUMI
Research Institute of Forests and Rangelands,
P.O. Box 13185-1166 Tehran (Iran)
maassoumi@rifr-ac.ir

Ghahremaninejad F., Bagheri A. & Maassoumi A. A. 2012. — Two new species of *Astragalus* L. sect. *Incani* DC. (Fabaceae) from the Zanjan province (Iran). *Adansonia*, sér. 3, 34 (1): 59-65.
http://dx.doi.org/10.5252/a2012n1a6

ABSTRACT
Astragalus dilutuloides Maassoumi, F.Ghahrem. & Bagheri, sp. nov. and *Astragalus montis-queydari* F.Ghahrem., Maassoumi & Bagheri, sp. nov. are described as new species. Morphological evidence (bifurcated trichome, acaulescence, free stipules, bibracteolate, non-inflated calyx in fruit) supports taxonomic placement of the new taxa in *Astragalus* L. sect. *Incani* DC. These are endemic to the Zanjan province of western Iran. *Astragalus dilutuloides* is close to *A. dilutulus* Maassoumi, but it differs with having longer habit, longer stipules, longer leaves, in leaves indumentum, longer peduncle, and color of bract and bracteoles hairs. *Astragalus montis-queydari* is close to *A. xiphidiopsis* Bornm., but it differs from the first new species with having longer stipules, fewer leaflets, shorter peduncle, and inflorescence with fewer flowers (4-10 vs 10-20).

KEY WORDS
Papilionaceae,
Astragalus subgenus *Cercidothrix*,
Astragalus sect. *Proselius*,
West Iran,
new species.

RÉSUMÉ
*Deux nouvelles espèces d'*Astragalus *L. sect.* Incani *DC. (Fabaceae) originaires de la province de Zanjan (Iran).*
Deux nouveaux taxons sont décrits : *Astragalus dilutuloides* Maassoumi, F.Ghahrem. & Bagheri, sp. nov. et *Astragalus montis-queydari* F.Ghahrem., Maassoumi & Bagheri, sp. nov. Leurs caractères morphologiques (trichome bifurqué, acaulescence, stipules libres, bibractéolées, calice non-accrescent dans le fruit) permettent de les ranger dans la section *Incani* DC. Ces espèces sont endémiques de la province de Zanjan, dans l'ouest de l'Iran. *Astragalus dilutuloides*, proche d'*A. dilutulus* Maassoumi, en diffère par un port plus élancé, une taille plus grande des stipules, des feuilles – trichome inclus – et du pédoncule, ainsi que par la couleur du trichome de la bractée et des bractéoles. *Astragalus montis-queydari*, affine d'*A. xiphidiopsis* Bornm., se distingue d'*A. dilutuloides* par des stipules plus longs, des folioles moins nombreuses, un pédoncule plus court et une inflorescence moins fournie (4-10 au lieu de 10-20 fleurs).

MOTS CLÉS
Papilionaceae,
Astragalus sous-genre *Cercidothrix*,
Astragalus sect. *Proselius*,
ouest de l'Iran,
espèces nouvelles.

INTRODUCTION

Genus *Astragalus* L. ("*Gavan*" in Persian), a member of the legume family (Fabaceae), with nearly 3000 species is probably the largest genus of flowering plants (Lock & Simpson 1991). The main center of diversity of the genus is probably in Iran with nearly 850 species (Maassoumi 1998; Ghahremaninejad 2004a; Ghahremaninejad & Bagheri 2009). *Astragalus* is the most important and genetically diverse Iranian genera, with an endemism rate of more than 60% and includes more than 11% of the Iran's flora.
In this paper, two new bifurcated species of the genus *Astragalus* sect. *Incani* DC. are newly described from Zanjan province, west Iran. These are a part of our result of new investigation on Fabaceae flora of the province. The diversity of the section in Zanjan province is nearly great (Ghahremaninejad & Bagheri 2009; Bagheri *et al.* 2011).

Because of their bifurcating hair *Astragalus* species are located in subgenus *Cercidothrix* Bunge (Bunge 1868; Ghahremaninejad 2004a). This taxon includes nearly 900 species in the Old World. It is characterized by perennial growth and presence of bifurcate hairs. It includes more than 180 species, in 17 sections, in Iran, with an endemism more than 60% (based on Podlech *et al.* 2010). *Astragalus* sect. *Incani* (syn.: sect. *Proselius* Bunge [Podlech 1990]), among subgenus *Cercidothrix* in Iran, showing the largest section with the high number endemic species. The concise description of the section follows.

SYSTEMATIC

Genus *Astralagus* L. sect. *Incani* DC.

In Candolle, *Prodromus Systematis Naturalis Regni Vegetabilis* 2: 304 (1825). — Lectotype: *A. incanus* L. (designated by Podlech [1990]).

Description

Herbaceous plants or rarely woody at the base, usually acaulescent; stipules free; leaves imparipinnate, rarely tri- or unifoliate; inflorescence dense or lax, usually long pedunculate; bibracteolate; calyx cylindric; pods sessile or stipitate, very variable in form, bilocular, coriaceous to lignified (Ghahremaninejad 2004a).

Remarks

The centre of diversity of this section is the Armeno-Iranian floristic province of the Irano-Turanian



Fig. 1. — *Astragalus dilutuloides* Maassoumi, F.Ghahrem. & Bagheri, sp. nov. from type specimen. Scale bar: 5 cm. Photo by Mr. Ehsan Hosseini.

region (Takhtajan 1986). The species of this section are distributed in Central Asia, the Middle East, South Asia, East Asia, West Asia, Caucasus, North Africa and Europe.

This section is the largest and most common bifurcate hairy section in Iran. It has a vast distribution zone in Iran, and occupies a large part of the country in the Elburz and Zagros mounts in north and west Iran (Ghahremaninejad 2004b). Its endemism ratio is more than 75% (based on Ghahremaninejad & Bagheri 2009; Podlech *et al.* 2010).

Astragalus dilutuloides

Maassoumi, F.Ghahrem. & Bagheri, sp. nov.
(Fig. 1)

Similis A. dilutulo *Maassoumi sed differt maximo habitu (c. 25-35 cm altus, nec 7 cm), stipulis 4-12 mm longis (nec 5 mm), foliis c. 7-18 cm longis (nec 2-6 cm), folio rachidisque dense appressis pilosis 9 (nec subpatentibus), pedunculo c. 10-18 cm longo (nec 4 cm), bractea bracteolisque dense nigropilosis (nec albopilosis) suffulto; ab* A. bukanensi *Maasoumi & Podlech leguminis dense nigropilosis (nec albo vel raro nigropilosis).*

Typus. — **Iran**. Zanjan province, 37 km on the road from Dandi to Tekab, mountain area, 2480 m, 8.VII.2009, *Bagheri 9014* (holo-, TARI!; iso-, FAR!, MSB!, P!, TARI!).

Description

Plant *c.* 25-35 cm tall, with appressed, symmetrically to asymmetrically medifixed, in vegetative parts only white hairs. Caudex *c.* 2-3 mm in diameter, divided, with short branches, densely covered with remnants of old leaves and stipules. Stipules brownish, *c.* 4-12 mm long, narrowly triangular, hairy, at the margins ciliate with basifixed hairs. Leaves 7-18 cm long; petiole 3-5 cm long, like the rachis densely covered with appressed, mostly asymmetrically medifixed hairs up to 0.5-1.5 mm long. Leaflets in 6-9 pairs, elliptic, 7-30 × 3-10 mm, at the apex obtuse to acute, on both side densely covered with ± appressed, symmetrically medifixed white hairs *c.* 1-2 mm long. Peduncle *c.* 10-18 cm long, densely covered with appressed black and short hairs up to 0.1-0.2 mm long later glabrescent. Raceme loosely many flowered. Bracts linear, acute, brownish, 2-3 mm long, sparsely pilose, at the margin with mostly basifixed hairs. Pedicels 3-5 mm long, deflexed, with black hairs. Bracteoles whitish, linear, at the base of calyx, *c.* 1.5 mm long, few black hairy. Calyx 9-13 mm long, tubular, slightly gibbous at the base, densely covered with appressed, symmetrically medifixed black hairs 0.2- 0.3 mm long; teeth linear, 3-4 mm long. Petals pale yellowish-green. Standard 15 mm long; blade rhomboid, *c.* 7 mm wide, emarginate at the apex, gradually narrowed at the base. Wings *c.* 13 mm long; blades narrowly oblong, slightly dilated towards the rounded apex, 7 × 2 mm; auricle 1.5 mm long, claw *c.* 8 mm long. Keel 11 mm long; blades obliquely obovate, with in upper part widely and nearly rectangularly curved lower edge and ± straight upper edge, subacute at the apex, 6.5 × 3 mm; auricle *c.* 1 mm long, claw 8.5-9 mm long. Ovary with a short stipe *c.* 1.5 mm long, narrowly oblong. Legume with a stipe 0.5 mm long, pendulous or some even erect, linear, straight or slightly upcurved, 25-40 mm long, 2-3 mm high and 3-5 mm wide, carinate ventrally by the prominent nerve, distinctly sulcate dorsally, at the apex narrowed into a straight beak 2-4 mm long; valves brownish, densely covered with a short subappressed to spreading medifixed black hairs mixed with some short flattened spreading asymmetrically to basifixed white hairy, fully bilocular. Seeds rectangular, 3.5-4 × 2 mm, dark brown, with short longitudinal furrow.

Remarks

The new species is close to *A. dilutulus* but it differs with having longer habit (25-35 not up to 7 cm long), longer stipules (4-12 not up to 5 mm long), longer leaves (7-18 not 2-6 cm long), in leaves indumentum (appressed not hirsute), longer peduncle (10-18 not up to 4 cm long), color of bract and bracteoles hair (black not white). Another relative species is *A. bukanensis*, but our new species has a different interesting character on the fruit hair color (black not white).

Distribution

Astragalus dilutuloides Maassoumi, F.Ghahrem. & Bagheri, sp. nov. is endemic to Iran and known only from the type locality. Recently the second author has collected the specimens of this species from



Fig. 2. — *Astragalus montis-queydari* F.Ghahrem., Maassoumi & Bagheri, sp. nov. from type specimen. Scale bar: 5 cm. Photo by Mr. Ehsan Hosseini.

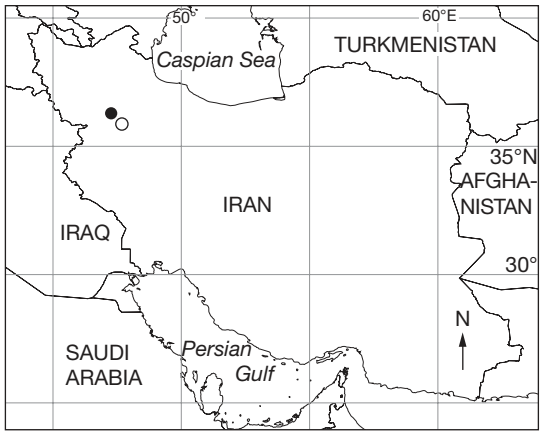


FIG. 3. — Distribution of *Astragalus dilutuloides* Maassoumi, F.Ghahrem. & Bagheri, sp. nov. (●) and *A. montis-queydari* F.Ghahrem., Maassoumi & Bagheri, sp. nov. (o).

Zanjan province, west Iran (Fig. 3). The species was found in a mountainously area with a mixture of soil and gravel bed within the Irano-Turanian region, at an altitude *c.* 2500 m.

The flowering and fruiting material was collected in July.

ETYMOLOGY

The specific epithet "dilutuloides" comes from the resemblance of the new species to *A. dilutulus*.

Astragalus montis-queydari
F.Ghahrem., Maassoumi & Bagheri, sp. nov.
(Fig. 2)

Similis A. xiphidiopsi *Bornm., sed differt stipulis* c. *9-11 (nec 5) mm longis, foliolis 3-6 (nec 8-10) jugis, pedunculo 3-11 (nec 7-20) cm longo, inflorescentiis 4-10 (nec 10-20) floris.*

TYPUS. — **Iran.** Zanjan province, Gheidar, on the lower slopes of Gheidar Mt., 2020 m, 14.V.2009, *Bagheri 6491* (holo-, TARI!; iso-, FAR!, MSB!, P!, TARI!).

DESCRIPTION

Plants 15-25 cm tall, with appressed, symmetrically to slightly asymmetrically medifixed hairs 0.5-0.7 mm long, merely white (only at the calyx sometimes with few very short black). Caudex up to 10 mm in diameter, branched, with short subterranean branches, covered with remnants of old leaves. Stipules whitish, 9-15 mm long, adnate to the petiole for 5 mm, the free part, triangular-acuminate, densely covered with white hairs. Leaves 8-18 cm long; petiole 3-8 cm long, densely hairy like the rachis. Leaflets in 3-6 pairs, linear to narrowly elliptic, 7-26 × 1-3 mm, obtuse to acute, on both sides covered with appressed hairs. Peduncle 3-11 cm long, erect, densely white hairy. Raceme 5-8 cm long, loosely 4-10 flowered; axis densely hairy. Bracts linear to lanceolate, triangular, 3-4 mm long, white hairy, ciliate on the margin with basifixed hairs. Pedicels 2-3 mm long, black and white hairy; flowers mostly erect. Bracteoles whitish, narrowly lanceolate, *c.* 1 mm long, at the base of calyx. Calyx 9-13 mm long, tubular, obliquely cut at the mouth, densely covered with appressed white hairs 0.3-0.7 mm long, sometimes with few to many much shorter black hairs and few white hairs; teeth unequal in length, subulate, 1-3 mm long, black and white simple hairy on inner side. Petals yellow to greenish-yellow. Standard *c.* 20 mm long; blade slightly upcurved, *c.* 10-11 mm wide, oblong-obovate, shortly triangularly narrowed toward, obtuse apex, at the base angularly narrowed into the cuneate claw. Wings 20 mm long, narrowly oblong, dilated toward apex obtuse, 11 × 3 mm; auricle 1.5 mm long, claw 10 mm long. Keel 18-19 mm long; blades oblong, oblique, subacute, 8-9 × 3-4 mm; auricle short, claw 10-11 mm long. Stamen-tube truncate at the mouth. Ovary linear, sessile, *c.* 10 mm long, glabrous. Legume unknown.

REMARKS

The new species is close to *A. xiphidiopsis*, but it differs from the new species with having longer stipules (9-11 not 5 mm long), fewer leaflets (3-6 not 8-10 pairs), shorter peduncle (3-11 not 7-20 cm long), inflorescence with fewer flowers (4-10 not 10-20 flowers).

DISTRIBUTION

Astragalus montis-queydari F.Ghahrem., Maassoumi & Bagheri, sp. nov. is endemic to Iran and known only from the type locality. Recently the second author has collected the specimens of this

species from Zanjan province, west Iran (Fig. 3). The species is thriving in Gheidar mountain at an altitude *c.* 2020-2050 m, a mountainous area with rocky substrate covered with a mixture of gravel and clay. The climate of Gheidar area is cold temperate. This area is located in Irano-Touranian region too.

The flowering and fruiting material was collected in May.

ETYMOLOGY

The specific epithet "montis-queydari" is derived from the type locality, Gheidar Mount, Zanjan province, Iran.

REFERENCES

BAGHERI A., MAASSOUMI A. A. & GHAHREMANINEJAD F. 2011. — Additions to *Astragalus* sect. *Hymenostegis* (Fabaceae) in Iran. *Iranian Journal of Botany* 17 (1): 15-19.

BUNGE A. 1868. — Generis *Astragali* species Gerontogeae 1, claves Diagnosticae. *Mémoires de l'Académie impériale des Sciences de Saint Petersbourg*, ser. 7, 11 (16): 94.

CANDOLLE A. P. DE 1825. — Astragaleae, *in Prodromus Systematis Naturalis, Regni Vegetabilis*. Vol. 2: 304.

GHAHREMANINEJAD F. 2004a. — Value of trichome characteristics for the separation of bifurcating hairy *Astragalus* L. (Fabaceae) at the sectional level. *Turkish Journal of Botany* 28: 241-245.

GHAHREMANINEJAD F. 2004b. — The sections of *Astragalus* L. with bifurcating hairs in Iran. *Turkish Journal of Botany* 28: 101-117.

GHAHREMANINEJAD F. & BAGHERI A. 2009. — *Astragalus andabadensis* (Fabaceae), a new species of *Astragalus* sect. *Incani* from Zanjan province, Iran. *Iranian Journal of Botany* 15 (2): 175-177.

LOCK J. & SIMPSON K. 1991. — *Legumes of West Asia, a Check-List*. Royal Botanic Gardens, Kew, 263 p.

MAASSOUMI A. A. 1998. — *Old World Check-List of* Astragalus. Research Institute of Forests and Rangelands, Tehran: 1-617.

PODLECH D. 1990. — Die Typifizierung der altweltlichen Sektion der Gattung *Astragalus* L. (Leguminosae). *Mitteilungen der Botanische Staatssammlung München* 29: 461-494.

PODLECH D., ZARRE S. H., MAASSOUMI A. A., EKICI M. & SYTIN A. 2010. — Papilionaceae VI. *Astragalus* IV, *in* RECHINGER K. H. (ed.), *Flora Iranica* 178. Naturhistorisches Museum, Wien: 155-415.

TAKHTAJAN A. L. 1986. — *Floristic Regions of the World*. University of California Press, Berkeley, Los Angeles, London, 522 p.

Submitted on 4 March 2011;
accepted on 7 November 2011.